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in nine years, showing the same ratio of increase with our population, and that the books copyrighted in America exceed those copyrighted in Great Britain.

These figures prove conclusively that the cheap foreign literature has increased the demand for American books by enlarging the circle of readers and cultivating a taste for reading; that an international copyright must, as all its advocates admit, increase the price of foreign books, cut off the supply of cheap literature, and thereby check the growing desire for reading; that it would therefore be a tax on knowledge, and would neither be for the interests of the people nor of the American authors, and will not promote science and the useful arts.

GARDNER G. HUBBARD.

A NEW ROUTE TO SOUTH-WESTERN CHINA.

MR. HOLT S. HALLETT'S studies and explorations have revolutionized our ideas with regard to the geography of Indo-China. It was only six years ago that Archibald Ross Colquhoun was an unknown engineer in the public works department of British Burmah. He became interested in the geography of Indo-China, and accompanied an expedition sent by the Indian government to Zimmé in northern Siam. The information gathered on that journey is embodied in his 'Amongst the Shans.' This trip only whetted his appetite for adventure, and in the winter of 1881-82 he crossed southern China from Canton to Mandalay. His intention had been to connect this exploration with that made on the Zimmé expedition. The local Chinese officials, however, placed so many obstacles in his path, that, when almost within sight of the boundary separating the Shan states from Yunnan, he was obliged to turn back and to make the best of his way to Mandalay by the comparatively well-known route *via* Tali-fu and Bamo. As he was about to lead another expedition to the Shan country, he was sent by the London *Times* as a war correspondent to Tonquin. Unable to carry out his explorations in person, he found a worthy coadjutor in Mr. Hallett, a practised surveyor, who had been for years in charge of some of the most important divisions of British Burmah. The object these two men had in view was the finding of a practicable railway-route connecting India and some British seaport with the fertile portions of south-western China.

Indo-China—as the south-eastern section of Asia, lying to the south of China proper, is now conveniently termed—is divided into three great natural divisions,—the western, drained by the

Irawaddy, Sittang, and Salwen, into the Bay of Bengal; the central, by the Meh-Kong or Cambodia River, and by the Meh-Nam, a river of Bangkok, into the Gulf of Siam; and the eastern, by the Son-tai, or Red River of Tonquin, into the Gulf of Tonquin. The valley of the Irawaddy is separated from that of the Salwen by a vast mountain-chain, while the eastern and central divisions are separated by a range or backbone running from the Tibetan plateau to the Malay peninsula. The lowest level of this latter range is in the latitude of Maulmain, a British seaport situated on the estuary of the Salwen. Now, as the most fertile portion of Yunnan is in the central division, obviously the best route for reaching it lies in crossing this great mountain-range in the latitude of Maulmain. This was the first conclusion at which the explorers arrived.

It is true that the line *via* Bamo and Tali-fu had hitherto been the favorite route. But, as Mr. Hallett points out,¹ although the distance between those two towns in a direct line is only two hundred and fifty miles, the shortest practicable route for a railway would be very nearly six hundred miles in length; and even then four passes between eight thousand and nine thousand feet above sea-level would have to be crossed.

Mr. Hallett's plan consists, then, in a railway running from Bangkok, the capital of Siam, up the Meh-Nam to its junction with the Meh-Ping; thence up the Meh-Ping by Raheng, where the line from Maulmain would come in, to a point near the confluence of the Meh-Ping and the Meh-Wung; then up the latter river, and across the water-parting between the Meh-Nam system and the Meh-Kong or Cambodia River, to the Meh-Kong at Kiang-Hsen, a town near the boundary between the Siamese and Burmese Shan states; thence over the plain bordering the Meh-Kong to Kiang-Hung, a town within fifty miles of Ssumao, a Chinese frontier town where Colquhoun was turned back.

The southern portion of this route was well known, owing in a great measure to the efforts of the American missionaries in Siam. Mr. Hallett's task, therefore, was to connect their explorations with those of Colquhoun. He carried to his work the skill of a practical engineer, and his surveys were made with such splendid precision that the cartographer of the Geographical society was able to construct an excellent map of northern Siam, which is reproduced in this number of *Science*.

Of course, there are several objections to this proposed route. It can be only indirectly con-

¹ "Exploration survey for a railway connection between India, Siam, and China" (*Proc. roy. geogr. soc.*, January, 1886).

nected with the Indian railway system by a line *via* Mandalay, the Chinwin valley, and a somewhat difficult mountain-pass. Then, again, the proposed route lies almost wholly within Siamese territory. But the government of Siam lives in great dread of French encroachments, and would probably welcome the English. At any rate, the Shans everywhere assisted Mr. Hallett, and expressed the greatest anxiety for better communications. Finally, it would tap only a portion of Yunnan, and would depend to a great extent for success on the building of railroads by Chinese themselves.

It must not be supposed that Mr. Hallett spent all his time in taking altitudes and other surveying work. He kept his eyes wide open, and has added vastly to our knowledge of the resources of Siam and of Siamese ethnology. In short, to use the words of Mr. Colquhoun, his work "has shed a bright ray of light upon a hitherto dark blot in our geographical knowledge, central Indo-China."

EDWARD CHANNING.

LONDON LETTER.

THE British association for the advancement of science will meet in Birmingham on Wednesday, Sept. 1, under the presidency of Sir William Dawson, LL.D., F.R.S., of the McGill university, Montreal. It will derive more than usual interest and importance from the exhibition of local manufactures within a radius of fifteen miles of the city, which is to be held in connection with it. The association has met thrice previously in Birmingham, — in 1838, 1849, and 1865, — and on each occasion such an exhibition was held. To the example of the first of these are due all international and other exhibitions since conducted on so large a scale.

The names of the royal commissioners on the working of the elementary education act of 1869 have just been published. The list comprises twenty-two names, all of those interested from various points of view, in the working of the act. The present government deserves great credit for the constitution of the *personnel* of the commission, which is a very strong one, all the chief religious, social, and political interests being well represented thereon. Sir John Lubbock is perhaps the strongest and most influential advocate for a place for pure science as an instrument of education, that could be found. His utterances thereon always command the respect of the house of commons and of the country. Sir Bernard Samuelson represents technical education; Mr. Samuel Rathbone (chairman of Liverpool school board), the official school board; Mr. Thomas

Heller, the body of teachers; and so on. Until this commission has reported, no legislation on the subject is likely to take place, although for a long time a feeling has been growing in the public mind that changes are necessary.

One result of the present educational system is that young persons leave the elementary schools at the ages of twelve or thirteen, and in the majority of instances go to work during the whole or a portion of the day, and scarcely ever pursue their education further. Inquiries set on foot by Canon Percival in Bristol, for example, elicited the fact that not five per cent of the children who thus leave school continue their education, in the scholastic sense of the term. To meet this difficulty, a system of evening classes has been devised, differing from such ordinary classes, inasmuch as the instruction is recreative, scientific, and practical. Attractive methods of teaching and demonstration are employed, in which the optical lantern has a large share. To Dr. Paton of Nottingham is mainly due the initiative of this movement, which was inaugurated for London at a crowded meeting held at the Mansion House on Jan. 16, presided over by the lord mayor, attended by the Princess Louise, and addressed by representatives of all shades of theological, political, and social position, from the Bishop of London and Mr. Mundella (who gave some startling figures as to the compulsory attendance on evening-schools in Germany) to representative workmen. It was stated that in London alone there were nearly half a million (420,000) young persons to whom the scheme would apply.

An important change in the matriculation examination of the University of London was, on Tuesday, Jan. 19, recommended to the senate by convocation, which, on the motion of Mr. W. L. Carpenter, B.A., B.Sc., adopted the report of a committee upon the subject. Hitherto three scientific subjects have been compulsory, — mathematics, natural philosophy (so called), and chemistry, and no alternatives were allowed. Under the proposed scheme, the 'natural philosophy' is subdivided, and a portion only is made compulsory. It is headed 'mechanics,' and the syllabus comprises those elementary but fundamental notions of statics, dynamics, etc., which are at the basis of all science. A candidate is then allowed an option between three branches of experimental science; viz., chemistry, heat and light, magnetism and electricity. Chemistry, therefore, ceases to be a compulsory subject (a change which may meet with the outcry directed some years ago against the abolition of Greek as a compulsory subject), while encouragement is given to the study of other branches of physics.